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PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)	
16 November 2000 (16.11.00)	
International application No.	**Applicant's or agent's file reference**
PCT/GB00/00980	A25712 WO
International filing date (day/month/year)	**Priority date** (day/month/year)
16 March 2000 (16.03.00)	26 March 1999 (26.03.99)
Applicant	
HARLAND, Philip et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

02 October 2000 (02.10.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer S. Mafla
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

RECD 02 JUL 2001
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70) 1 4

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
A25712 WO		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/00980	16/03/2000	26/03/1999
International Patent Classification (IPC) or national classification and IPC G06F17/30		
Applicant BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
02/10/2000	28.06.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Mengele, S Telephone No. +49 89 2399 2720

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00980

I. * Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-11 as originally filed

Claims, No.:

1-9 as originally filed

Drawings, sheets:

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-8
	No:	Claims	1,9
Inventive step (IS)	Yes:	Claims	
	No:	Claims	2-8
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

1. ad section V:

1.1 Reference is made to the following document/s/:

D1 = EP-A-0 757 313;
D2 = US-A-5,732,275.

1.2 The prior art known from D1 (see in particular page 7, lines 17 to 47 with Fig.5) anticipates all features of Claim 1, with the claimed version of an application program corresponding to the original application objects 302 of D1, the claimed data access component corresponding to the persistence subsystem of D1, the claimed earlier version of the structure of its associated data set corresponding to the original database objects A-D of D1, and the claimed present version of the structure of its associated data set corresponding to the original database objects A-D together with their associated attribute objects 1-4.
In addition, said prior art known from D1 anticipates also all features of Claim 9, with the claimed changing of the structure of one of said data sets corresponding to the association of attributes to the original database objects.

Hence, the subject-matter of Claims 1 and 9 lack novelty.

1.3 Dependent Claims 2 to 8 do not appear to contain any additional features which involve an inventive step:

1.3.1 It is well known to the skilled person that a data set would comprise a set of records each of which has a set of fields and that the associated attributes of D1 would be stored in additional fields. Hence, the subject-matter of Claim 2 does not involve an inventive step.

1.3.2 D1 describes an object-oriented approach. Hence, the features introduced in Claim 3 are obvious.

1.3.3 Client-server computing, distributed storing of programs and data on the client and server, respectively, as well as downloading programs from the server to the client are well known to the skilled person; see for example D2, column 3, line 58 to column 4, line 19 with respect to the matter of Claim 5. Hence, provision of the features introduced in Claims 4 to 8 lies within the normal design activity of the skilled person.

Therefore, the subject-matter of Claims 2 to 8 do not involve an inventive step.

2. ad section VII:

2.1 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.

2.2 The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

PATENT COOPERATION TREAT

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
A25712 WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/ 00980	16/03/2000	26/03/1999
Applicant		
BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 6

[X] as suggested by the applicant.

[ ] None of the figures.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 00/00980

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30 G06F9/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G03F G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"The Component Object Model Specification, version 0.9, 24 October 1995 (1995-10-24), Microsoft Corp. XP002141833	1-4,9
Y	page 21, line 7 - line 13	5,7
Y	US 5 732 275 A (TITUS DIANE ET AL) 24 March 1998 (1998-03-24) column 3, line 58 -column 6, line 61	5
Y	WO 97 31498 A (RANTANEN KARI ;FINLAND TELECOM OY (FI)) 28 August 1997 (1997-08-28) the whole document	7

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 July 2000	20/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Bijn, K

1

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 838 771 A (NAVIGATION TECHNOLOGIES CORP) 29 April 1998 (1998-04-29)	1,2
A	page 4, line 1 -page 5, line 18 page 22, line 23 -page 23, line 28	3,4,8,9
X	EP 0 757 313 A (INTERGRAPH CORP) 5 February 1997 (1997-02-05) page 5, line 42 -page 7, line 47	1,2,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/00980

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5732275 A	24-03-1998	NONE	
WO 9731498 A	28-08-1997	FI 960760 A	21-08-1997
		AU 1797997 A	10-09-1997
		CA 2249545 A	28-08-1997
		CN 1211374 A	17-03-1999
		EP 0951789 A	27-10-1999
		NO 983780 A	16-10-1998
EP 0838771 A	29-04-1998	US 6047280 A	04-04-2000
		JP 10253367 A	25-09-1998
		US 5974419 A	26-10-1999
		US 5953722 A	14-09-1999
EP 0757313 A	05-02-1997	US 5778227 A	07-07-1998

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : G06F 17/30, 9/44

A1

(11) International Publication Number: **WO 00/58864**

(43) International Publication Date: 5 October 2000 (05.10.00)

(21) International Application Number: PCT/GB00/00980

(22) International Filing Date: 16 March 2000 (16.03.00)

(30) Priority Data:

9907090.6	26 March 1999 (26.03.99)	GB
99305539.1	20 December 1999 (20.12.99)	EP

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(72) Inventors; and

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(74) Agent: ROBERTS, Simon, Christopher; BT Group Legal Services, Intellectual Property Department, 8th Floor, Holborn Centre, 120 Holborn, London EC1N 2TE (GB).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

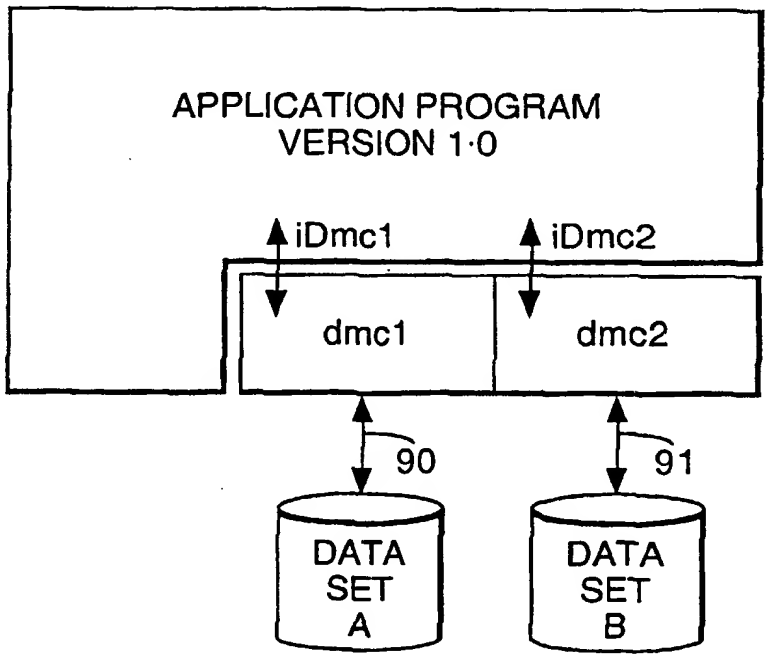
Published

With international search report.

(54) Title: COMPUTER SYSTEM

(57) Abstract

A computing system includes an application program and two data access components dmc1 and dmc2 loaded on to a client computer. The data access components dmc1 and dmc2 provide access to data sets A and B stored on a server computer. Each data access component is arranged to handle a data query from the application program directed to its associated data set. If the structure of one of the data sets is changed, for example to add a new field, then the associated data access component is also modified. The modification to the data access component permits it to handle queries from the present version of the application program directed to the data set but designed for the data set before the change in its structure. The modification to the data access component also enables it to handle queries directed to the data set with the changed structure from an updated application program which is designed to take advantage of the new structure of the data set.



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COMPUTER SYSTEM

This invention relates to a computer system.

As is well known, a computer system may include an application program installed and loaded on to the computer system and which is capable of accessing one or more data sets stored on the computing system. As is well known, an application program may be updated from time to time to produce a new version with additional functionality. Thus, it is quite usual to produce a series of versions of a particular application program. The structure of a data set may also be updated from time to time, for example by adding one or more additional fields. With presently known computing systems, when the structure of a data set is updated, it is necessary to produce an updated version of the associated application program in order to enable it to access the data set. Some users of the application program may not wish to suffer the inconvenience of obtaining an updated version. Also, after a new version of an application program has been produced, the users of it will have to be trained how to use it and so there will be a period during which some users will want to continue using the previous version of the application program.

According to one aspect of this invention there is provided a computer system including a version of an application program stored in said computer system, at least one data access component stored in said computer system, the or each data access component being associated with a set of data stored in said computer system, the or each data access component being arranged to received a data query from said version of said application program, access its associated data set in response to said query, and transmit a reply to said version of said application program, and one of said data access components being arranged to access its associated data set both to respond to a query designed for the present version of the structure of its associated set and also to respond to a query designed for an earlier version of the structure of its associated data set.

In this specification, the term "data set" is intended to refer to a set of functionally related data records which are accessed together as a unit.

With this invention, when the structure of a data set is updated, it is only necessary initially to produce an updated version of the associated data access component and not the associated application program. After the updated version of

the data access component has been installed on the computer system, the present version of the application program will be able to access the data set in the new structural version. Also, when an updated version of the application program is produced and installed on a computer, this will also be able to access the data set in the new structural version.

The or each data set may comprise a set of records, each of which has a set of fields, and the difference between the present and earlier versions of the structure of the data set associated with said one data access component is that the records of the present version of the structure of the data set include at least one additional field.

Preferably, each data access component comprises at least one software object, and said one data access component comprises at least two software objects, one of which is arranged to respond to a query designed for the present version of the structure of its associated data set, and the other of which is designed to respond to a query designed for the earlier version of the structure of its associated data set.

The computer system may include a client computer, a server computer and a communications network arranged to connect the client computer and server computer, said version of said application program and said at least one data access component being stored on said client computer, and said data sets being stored on said server computer.

There may be a plurality of versions of said application program stored on said server computer, said client computer being arranged to download one or more versions of said versions application program from said server computer for use on said client computer.

Said at least one data access component may be stored on said server computer, and said client computer may be arranged to download said at least one data access component from said server computer for use on said client computer.

When operating the computer system, preferably a version of the application program and said at least one data access component are downloaded in separate operations.

According to another aspect of this invention there is provided a method of operating a computer system, said computer system including a version of an application program stored in said computer system, at least one data access

component stored in said computer system, the or each data access component being associated with a set of data stored in said computer system, the or each data access component being arranged to receive a data query from said version of said application program, access its associated data set in response to said query, and transmit a reply to said version of said application program, said method comprising the steps of changing the structure of one of said data sets, and modifying the data access component associated with said one data set, the modification to said data access component permitting it to handle queries from the present version of the application program directed to said one data set but designed for the data set before the change in its structure.

This invention will now be described in more detail, by way of example, with reference to the drawings in which:

Figure 1 is a block diagram of a directory assistance system for a telecommunications network embodying this invention;

Figure 2 shows the structure of the records of a data set used by the system of Figure 1;

Figure 3 shows an updated version of the structure for the records shown in Figure 2;

Figure 4 shows the software components of a workstation forming part of the directory assistance system of Figure 1;

Figure 5 is a flow chart illustrating the operation of the workstation;

each of Figures 6 to 10 is a functional block diagram showing an application program and associated data access components which may be installed in the workstation together with their interaction with data sets which may be stored in a server computer forming part of the directory assistance system of Figure 1; and

Figure 11 is a block diagram illustrating the construction of a data access component.

Referring now to Figure 1, there is shown a directory assistance system 10 for a public switched telecommunications network (PSTN) 12. The directory assistance system 10 includes a switch 14 connected to the PSTN 12 and which distributes incoming calls to a set of workstations used by directory assistance operators. One of these workstations is shown and indicated by reference numeral 16. The workstations, including workstation 16, are connected to a local area

network (LAN) 18. LAN 18 is connected to a local server computer 20, the purpose of which will be described in more detail below. LAN 18 is also connected to a router 21 which in turn is connected to a wide area network (WAN) 22. WAN 22 is connected to a remote server computer 24. The remote server computer 24 stores a large set of records, each of which contains details of one of the customers of the PSTN 12. In each record, the details include the name, address and telephone number of the customer.

The workstation 16 and other workstations connected to the switch 14, the LAN 18, the local server computer 20 and the router 21 are co-located in the same physical site. The remote server computer 24 also serves workstations located at other sites.

Each of the workstations, including workstation 16, has an application program which can perform a search on the records stored in the remote server computer 24 to retrieve the telephone number of a customer of PSTN 12 in response to an enquiry from a caller. When performing a search, the user or operator enters the name of the customer on the workstation 16 and usually other details such as the initials of the customer, the town where the customer is located or part or all of the address of the customer. As will be described below, the user can also be assisted by accessing records stored in the local server 20.

From time to time, the format or structure of the records stored in the remote server 24 may be updated to produce a new version. When a new version is produced, the application program used by the workstations must also be updated so as to enable it to access the new version. For a transitional period, the old and new versions of the records may both be stored on the remote server 24 or one version may be stored on the remote server 24 and another version stored on another server computer connected to WAN 22. This enables the records to be accessed using both the old and new versions of the application program.

As may be readily appreciated, the directory assistance system 10 is also a computing system. The computers include the workstations, the local server computer 20 and the remote server computer 24. The hardware construction of each of these computers is conventional and includes a central processing unit, a store formed from a combination of read-only-memory, random-access-memory, hard disk storage and floppy disk storage, a keyboard, visual display unit and input and output

ports. In each of the computers, an operating system and one or more application programs are held in the store and provide the desired functionality.

The various versions of the application program used by the workstation 16 are stored in the local server 20. As will be described in more detail below, each workstation is arranged to download the various versions of the application program from the local server 20. For each user of the workstations, the local server 20 contains a record setting out the details of the user and the version or versions of the application program which that user is permitted to use. Several sets of data records are also stored on the local server 20. Each of these sets of records is designed to assist the users of the workstations in answering enquiry calls.

One of these sets of data is a set of locality records. When making an enquiry for the telephone number of a customer of the PSTN 12, a caller will sometimes give incorrect information with regard to the locality of the customer. For example, rather than giving the correct town in which the customer is located, the caller may give the name of a nearby town. The purpose of the locality records is to enable a user of a workstation to extend the search to neighbouring areas. The fields of a typical locality record are shown in Figure 2. As may be seen, these records include a field 40 for a town, a field 41 for the nearest town to the town entered in field 40, a field 42 for the next nearest town and a field 42 for the county in which the town is located. Thus, when using this set of records, the user accesses the record for the town given by the caller. The user may then use the data in the record to extend the search to the nearest town, the next nearest town or to the county in which that town is located.

In the system of Figure 1, it may be desired to change the structural format of one of the sets of data records. For example, the structure of one of the sets of data records could be changed by adding an additional field. Referring to Figure 3, there is shown a modified structure for the set of locality records. In the structure shown in Figure 3, each locality record has a field 50 for a town, a field 51 for the nearest town, a field 52 for the next nearest town, a field 53 for the county in which the town is located and a field 54 for the nearest county. Thus, in comparison with the structure shown in Figure 2, the structure shown in Figure 3 includes an additional field, namely the field 54, for the nearest county.

When the structure of a set of data records is modified, for example as illustrated with reference to Figures 2 and 3, then the application program which is used to access those data records must be updated to take advantage of the modification. Also, in the absence of the present invention, the application program would have to be updated even to access data records arranged in the new structure.

In this invention, and as will be described in more detail below, each set of data records stored in the local server computer 20 has an associated data access component. A copy of this data access component is loaded into each workstation which accesses those data records. In use, an application program installed on a workstation does not access a set of data records stored in the local server computer 20 directly. Instead, it accesses the data records via the associated data access component.

With the invention, when the structure of a set of data records is changed, then the associated data access component is modified. The data access component is modified so that both the existing version of the application program and the modified version of the application program will be able to access the data records with the modified structure via the modified data access component. When the existing version of the application program accesses the data records, it will not be able to take advantage of any extra features, for example an extra field, in the modified structure of the data records. In contrast, the modified version of the application program will be able to take advantage of any additional features.

Thus, with the invention, when the structure of a set of data records is modified, it is necessary initially only to modify the data access component and not the whole application program itself. The invention also provides the advantage that the data records for the new structure can be used with both the existing and modified versions of the application program. This allow the users of the application program to continue using the data records while they are being trained in the use of the modified version of the application program.

Referring now to Figure 4, there are shown the main software components installed into each of the workstations, such as the workstation 16, of the directory assistance system 10. As shown in Figure 4, these components include an operating system 60, a control program 61, application programs 62 and a set of data access components 63. Normally, a complete set of the current versions of the main

application program are loaded into each of the workstations. The main function of the control program 61 is to download the current versions from the local server computer 20 and to delete any version which is no longer in use. As explained above, each data access component is associated with a set of data records stored on the local server 20.

Referring now to Figure 5, there is shown a flow chart illustrating the operation of one of the workstations.

Initially, in a step 70, the control program obtains a list of available versions of the main application program from the server computer. The main application program is the program which is used for answering enquiries from calling parties. All further references in this description to the application program are to be understood as references to this main application program.

Next, in a step 72, the control program obtains a list of the versions of the application program installed on the workstation. Then, in a step 73, any version of the application program which is no longer available is removed by deleting from the store of the workstation.

Next, in a step 74, the control program downloads from the server computer any available versions of the application program which are not currently installed on the workstation. Then, in a step 75, the current versions of the data access components are downloaded from the server computer and stored in the workstation. These current versions replace any previous versions stored in the workstation.

In a step 76, the control program starts-up the last used version of the application program. The last used version of application program is the version of the application which has been most recently used on the workstation.

The application program itself, in a step 77, then obtains the data record for the present user of the workstation from the server computer. The user record specifies the version or versions which the user is permitted to use. In a step 78, the user then selects the required version of the application program. If the user is permitted to use more than one version of the application program, the user makes a selection based on the user's present requirements. For example, the user may use one version for answering enquiries and another version for training.

In a step 79, the application program checks whether the required version is running. If the required version is running, a jump is made to step 80. If the required

version is not running, in steps 81 and 82, the control program shuts shown the version of the application program which is currently running and then starts up the required version. This is followed by step 80. In step 80, the user uses the application program either for training or for answering enquiries from calling parties.

Referring now to Figure 6, there is shown the arrangement of version 1.0 of the application program, two data access components dmc1 and dmc2 and two data sets A and B. The data access components dmc1 and dmc2 provide access to the data sets A and B, respectively, as indicated by arrows 90 and 91. The interfaces between the application program and data management components dmc1 and dmc2 are provided, respectively, by interfaces iDmc1 and iDmc2. These interfaces are provided by portions of code in the application program and the data management components.

Each of the data management components dmc1 and dmc2 is constructed so as to provide server functionality and each of these data management components is arranged to respond to queries from the application program. Thus, for example, when the data access component dmc1 receives a query from the application program across the interface iDmc1, the data access component dmc1 accesses the data set A to obtain the required information. After obtaining the required information, the data access component dmc1 sends a response across the interface iDmc1 to the application program. The data sets A and B are, as explained above, stored in the local server computer 20.

Referring now to Figure 7, there is shown a modification to the arrangement of Figure 6. In this modification, the data set A has been replaced by a modified data set A_v2 and the data access component dmc1 has been replaced by a modified data access component dmc1_v2. In comparison with the data set A, the structure of the data set A_v2 has been modified, for example by adding an extra field to each record. The modified data access component dmc1_v2 is arranged to access the modified data set A_v2. However, the data access component dmc1_v2 presents the same interface iDmc1 to the application program as that presented by the original data access component dmc1. Thus, the modified data access component dmc1_v2 can respond to queries received across the interface iDmc1. However, as the application program is still version 1.0 of the application program, it cannot take advantage of the extra functionality provided by the modification to the structure of the data set.

It should be noted that no change has been necessary to the application program itself and that only the data access component has been modified.

Referring now to Figures 8 and 9, there are shown two modifications to the arrangement of Figure 6. In each of these arrangements, the data set B has been replaced by a modified data set B_v2 and the data management component dmc2 has been replaced by a modified data management component dmc2_v2. In comparison with the data set B shown in Figure 6, the structure of the data set B_v2 has been modified, for example by adding an additional field. The arrangement of Figure 8 uses version 1.0 of the application program whereas the arrangement shown in Figure 9 uses version 2.0 of the application program. In comparison with version 1.0 of the application program, version 2.0 is designed to produce queries designed for the modified data set B_v2 and thus to take advantage of the additional functionality which is present in modified data set B_v2.

The modified data access component dmc2_v2 is designed to present the interface iDmc2 to version 1.0 of the application program and to present a modified interface iDmc2_2 to version 2.0 of the application program. For this reason, the interface iDmc2 is indicated by arrows joined by a solid line in Figure 8 but by arrows joined by a dotted line in Figure 9. Likewise, the modified interface iDmc2_2 is indicated by arrows joined by a dotted line in Figure 8 and a solid line in Figure 9.

When the modified data access component dmc2_v2 is used with version 1.0 of the application program, it receives and responds to queries over the interface iDmc2. When it is used with version 2.0 of the application program, it receives and responds to queries over the modified interface iDmc2_2.

As will be described with reference to Figure 10, it is possible to arrange data access components so that a single interface to an application program can be used for making queries to two or more data sets.

Referring now to Figure 10, there is shown an application program, two upper level data management components dmc3 and dmc4, two lower level data access components dmc3x and dmc3y and three data sets X, Y and Z. The data sets X, Y and Z are stored in the local server computer 20.

The data access components dmc3 and dmc4 present, respectively, interfaces iDmc3 and iDmc4 to th application program. The data access component

dmc4 is arranged to respond to queries from the application program received on the interface iDmc4 and directed to the data set Z.

The data access component dmc3 has an interface to each of the lower level data access components dmc3x and dmc3y. The lower level data access component dmc3x is arranged to access data set X and the lower level data access component dmc3y is arranged to access the data set Y. Collectively, the data access components dmc3, dmc3x and dmc3y are arranged to respond to queries received on the interface iDmc3 and directed to either data set X or data set Y.

In a similar manner to that described with reference to Figures 6 to 9, if the structure of one of the data sets X, Y and Z is modified, then the associated data access component is modified accordingly. Thus, for example, if the structure of data set X is modified, then data access component dmc3x is modified.

Each data access component is formed from a number of software objects. Specifically, each data access component includes an individual software object for each interface provided by that data access component and a software object for accessing the associate data set.

Referring now to Figure 11, there are shown the software objects which form the data access component dmc2_v2. These software objects include two software objects CDmc2 and CDmc2_2 which, respectively, provide the interfaces iDmc2 and iDmc2_2. The data access component dmc2_v2 also includes a software object CDsetB_v2 for accessing the data set B_v2. The software object CDsetB_v2 can receive messages from, and transmit messages to, each of the software object CDmc2 and CDmc2_2.

Each application program includes a set of software objects which generate messages to, and receive messages from, the interface objects in the associated data access components. In relation to a data access component, each of the software objects functions as a client object. By way of example, Figure 10 shows a client software object ClientObj1 which can send messages to, and receive messages from, the interface object CDmc2 across the interface iDmc2.

In each data access component, the individual software objects collectively provide the methods which are needed for performing searches on the associated data set and for retrieving items of data for use by an application program. The data set associated with the data access component is private to the software objects of

that data access component in the sense that it can only be accessed by these software objects. The data set is thus encapsulated by the software objects of the associated data access component. The concept of encapsulation is well known in object oriented design.

In each data access component, the individual software objects may be formed from a group of subsidiary objects.

Although this invention has been described with reference to a directory enquiry system, it is to be appreciated that it is suitable for general use in computing systems.

The invention is equally applicable to systems in which the communications link between the client and server computers includes a radio link. For example, the invention finds application with Mobile –IP (Internet Protocol) terminals (which may be mobile phones, PDAs, laptop computers or the like), WAP terminals (which again may be mobile phones or more sophisticated devices) and similar devices. Such terminals would typically provide a client computer of a client server system.

The invention (in particular, the data access component) will typically be embodied in software and, as such, the invention extends to a data carrier or data carriers (magnetic tapes or discs, memory sticks, optical discs or other data carriers) carrying such software. The software may be transferred over a data link.

Although this invention has been described with reference to a computing systems formed from several computers, it is to appreciated that it is also suitable for use on a computing system formed from a single computer. Where the invention is used with a computing system formed from a single computer, then the application program or programs, data access component or components and the associated data set or sets are all stored on the single computer.

CLAIMS

1. A computer system including:

a version of an application program stored in said computer system;

at least one data access component stored in said computer system, the or each data access component being associated with a set of data stored in said computer system;

the or each data access component being arranged to receive a data query from said version of said application program, access its associated data set in response to said query, and transmit a reply to said version of said application program; and

one of said data access components being arranged to access its associated data set both to respond to a query designed for the present version of the structure of its associated data set and also to respond to a query designed for an earlier version of the structure of its associated data set.

2. A computer system as claimed in claim 1, in which the or each data set comprises a set of records each of which has a set of fields, and the difference between the present and earlier versions of the structure of the data set associated with said one data access component is that the records of the present version include at least one additional field.

3. A computer system as claimed in any one of the preceding claims, in which each data access component comprises at least one software object, and said one data access component comprises at least two software objects, one of which is arranged to respond to a query designed for the present version of the structure of its associated data set and the other of which is arranged to respond to a query designed for the earlier version of the structure of it associated data set.

4. A computer system as claimed in any one of the preceding claims, in which:

the computer system includes a client computer, a server computer and a communications network arranged to connect the client computer to the server computer; and

said version of said application program and said at least one data access component are stored on said client computer; and

said data sets are stored in said server computer.

5. A computer system as claimed in claim 4, in which a plurality of versions of said application program are stored on said server computer, and said client computer is arranged to download one or more of said versions of said application program from said server computer for use on said client computer.

6. A computer system as claimed in claim 5, in which said at least one data access component is stored on said server computer, and said client computer is arranged to download said at least one data access component from said server computer for use on said client computer.

7. A computer system as claimed in any one of claims 4 to 6, wherein the client computer is a mobile phone, WAP terminal or mobile-IP terminal and the communications network includes a radio transmission system over which data connections can be made between the client computer and the server computer.

8. A method of operating the computer system of claim 6, in which at least one version of the application program and said at least one data access component are downloaded from the server computer in separate operations.

9. A method of operating a computer system, said computer system including a version of an application program stored in said computer system, at least one data access component stored in said computer system, the or each data access component being associated with a set of data stored in said computer system, the or each data access component being arranged to receive a data query from said version of said application program, access its associated data set in response to said query, and transmit a reply to said version of said application program, said method comprising the steps of:

changing the structure of one of said data sets; and

modifying the data access component associated with said one data set;

the modification to said data access component permitting it to handle queries from the present version of the application program directed to said one data set but designed for the data set before the change in its structure.

Fig.1.

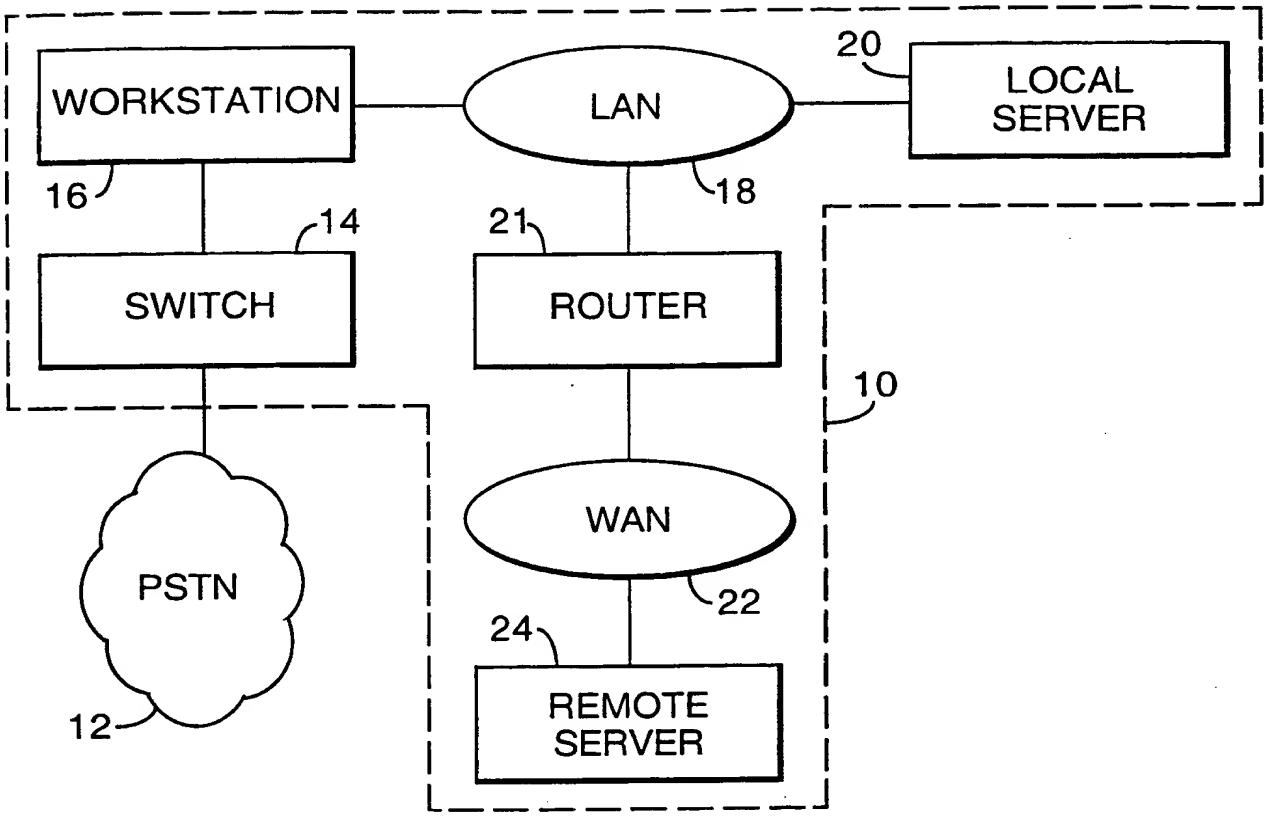


Fig.2.

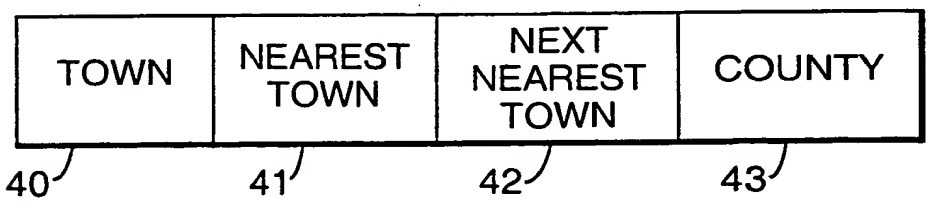


Fig.3.

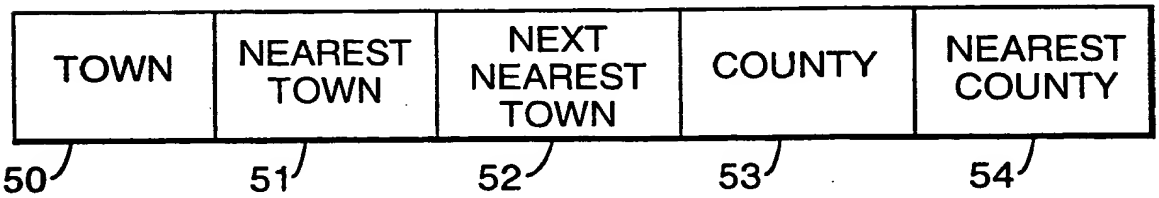


Fig.4.

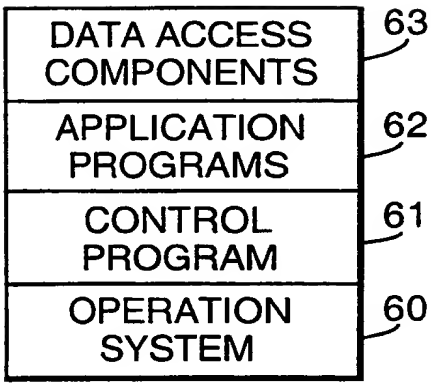

DATA ACCESS COMPONENTS
63
APPLICATION PROGRAMS
62
CONTROL PROGRAM
61
OPERATION SYSTEM
60

Fig.5A.

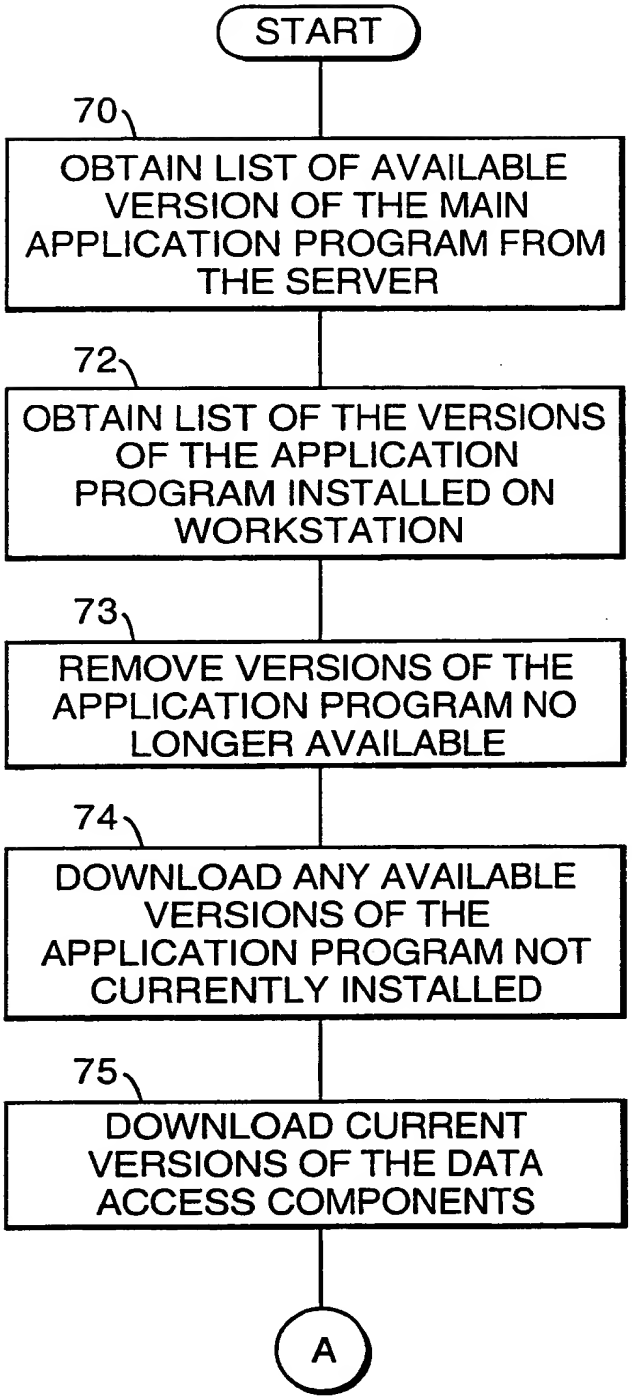

START
70
OBTAIN LIST OF AVAILABLE VERSION OF THE MAIN APPLICATION PROGRAM FROM THE SERVER
72
OBTAIN LIST OF THE VERSIONS OF THE APPLICATION PROGRAM INSTALLED ON WORKSTATION
73
REMOVE VERSIONS OF THE APPLICATION PROGRAM NO LONGER AVAILABLE
74
DOWNLOAD ANY AVAILABLE VERSIONS OF THE APPLICATION PROGRAM NOT CURRENTLY INSTALLED
75
DOWNLOAD CURRENT VERSIONS OF THE DATA ACCESS COMPONENTS
A

Fig.5B.

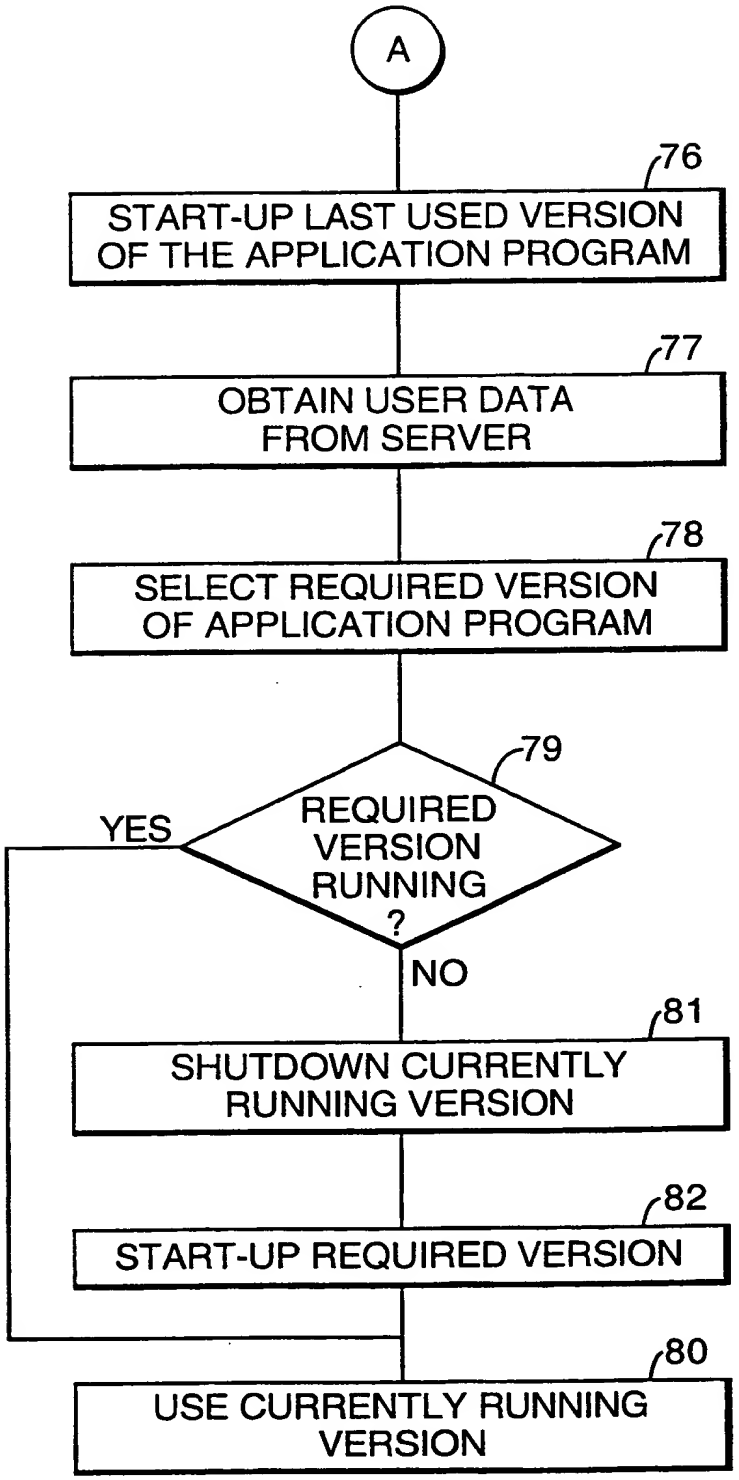

A
76
START-UP LAST USED VERSION OF THE APPLICATION PROGRAM
77
OBTAIN USER DATA FROM SERVER
78
SELECT REQUIRED VERSION OF APPLICATION PROGRAM
79
REQUIRED VERSION RUNNING ?
YES
NO
81
SHUTDOWN CURRENTLY RUNNING VERSION
82
START-UP REQUIRED VERSION
80
USE CURRENTLY RUNNING VERSION

Fig.6.

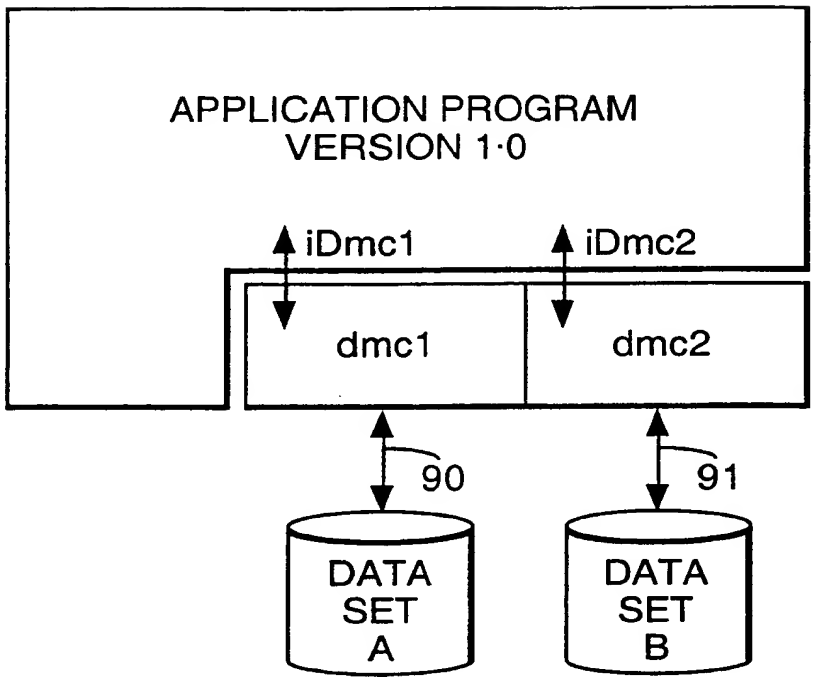

APPLICATION PROGRAM
VERSION 1·0
iDmc1
iDmc2
dmc1
dmc2
90
91
DATA SET A
DATA SET B

Fig.7.

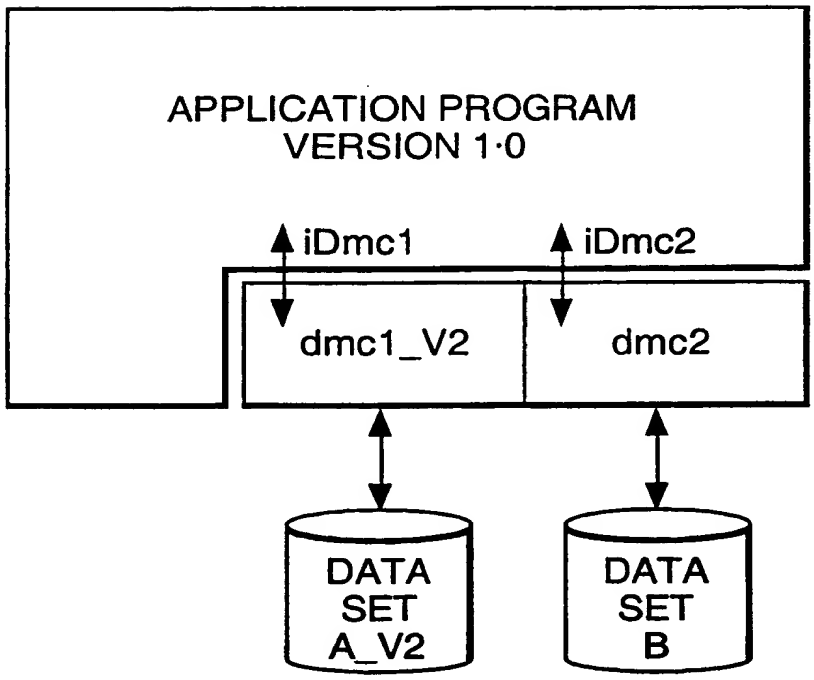

APPLICATION PROGRAM
VERSION 1·0
iDmc1
iDmc2
dmc1_V2
dmc2
DATA SET A_V2
DATA SET B

Fig.8.

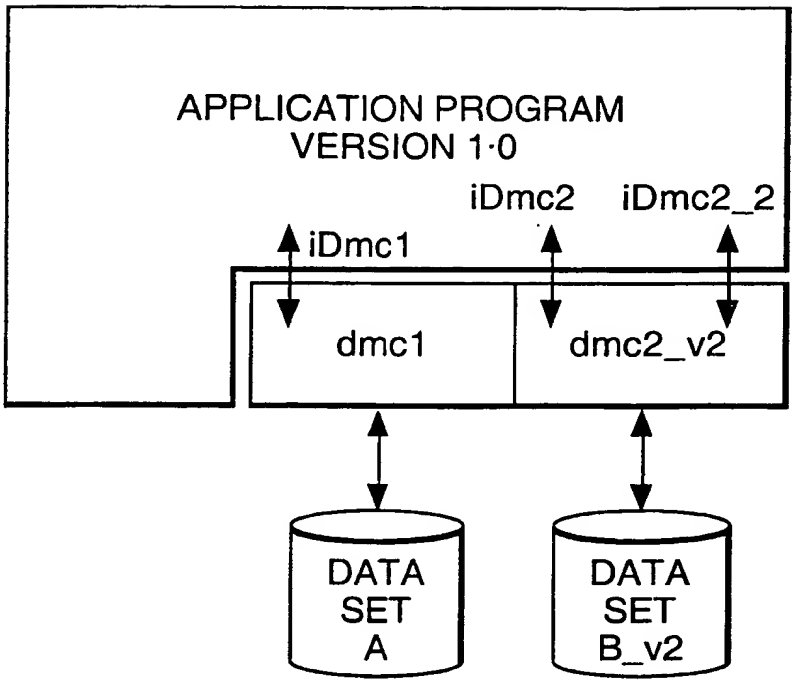

APPLICATION PROGRAM
VERSION 1·0
iDmc2
iDmc2_2
iDmc1
dmc1
dmc2_v2
DATA SET A
DATA SET B_v2

Fig.9.

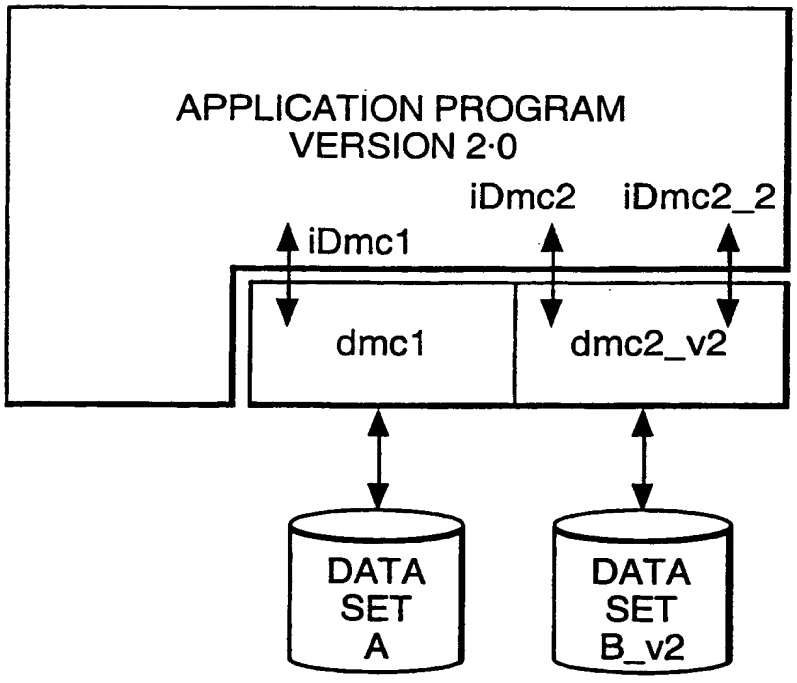

APPLICATION PROGRAM
VERSION 2·0
iDmc2
iDmc2_2
iDmc1
dmc1
dmc2_v2
DATA SET A
DATA SET B_v2

Fig.10.

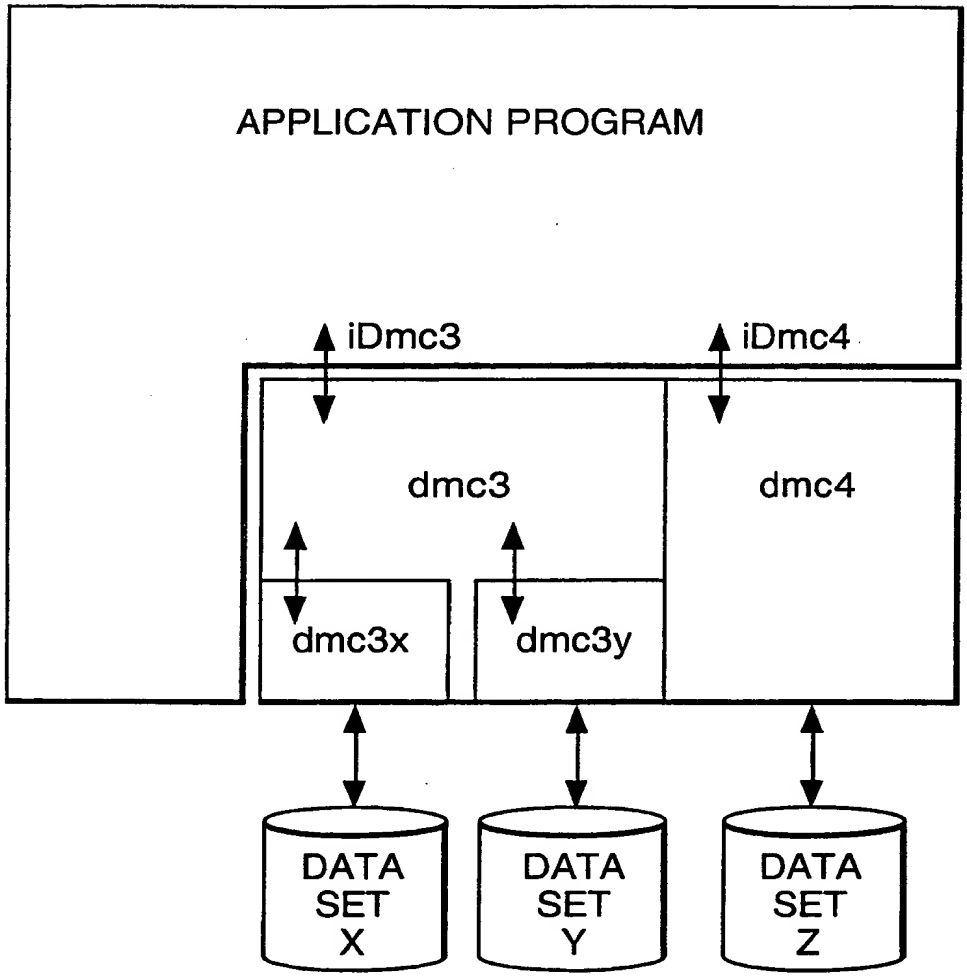
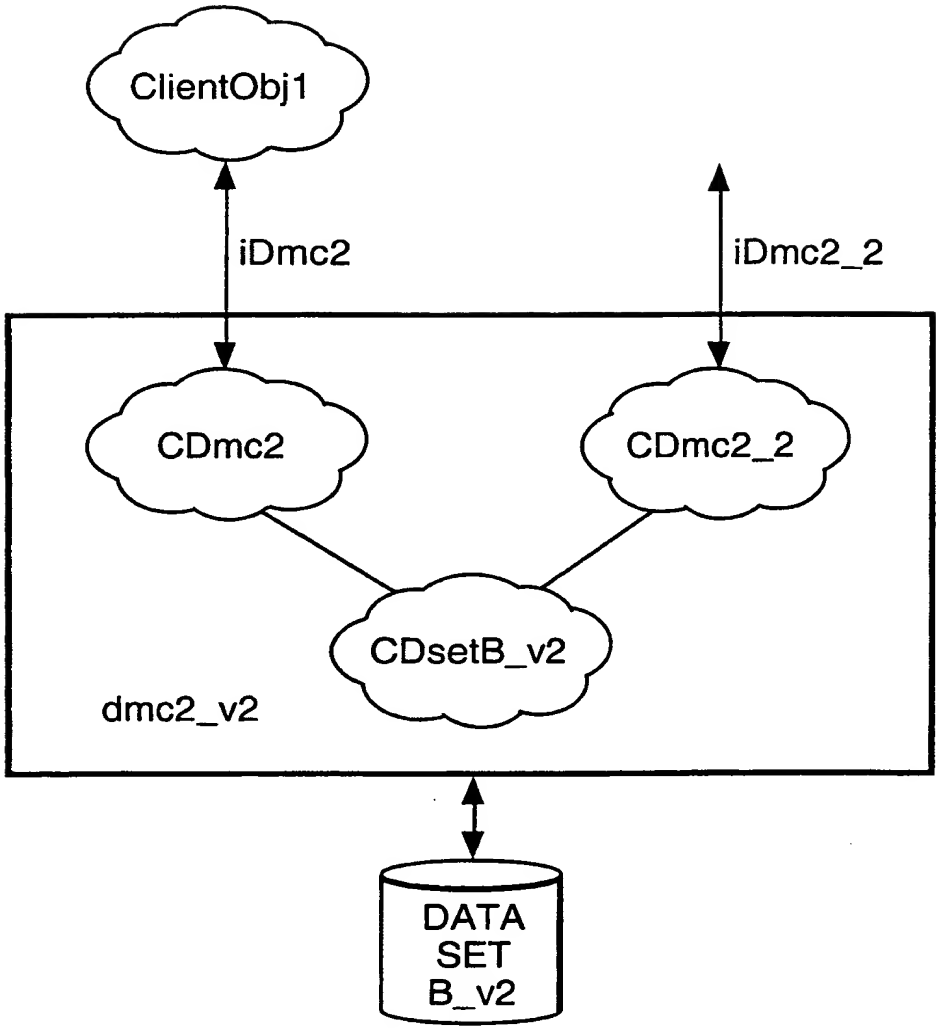

APPLICATION PROGRAM
iDmc3
iDmc4
dmc3
dmc4
dmc3x
dmc3y
DATA SET X
DATA SET Y
DATA SET Z

Fig.11.


ClientObj1
iDmc2
iDmc2_2
CDmc2
CDmc2_2
CDsetB_v2
dmc2_v2
DATA
SET
B_v2

INTERNATIONAL SEARCH REPORT

Inter. ..onal Application No
PCT/GB 00/00980

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30 G06F9/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G03F G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate. of the relevant passages	Relevant to claim No.
X	"The Component Object Model Specification, version 0.9, 24 October 1995 (1995-10-24), Microsoft Corp. XP002141833	1-4,9
Y	page 21, line 7 - line 13 ---	5,7
Y	US 5 732 275 A (TITUS DIANE ET AL) 24 March 1998 (1998-03-24) column 3, line 58 -column 6, line 61 ---	5
Y	WO 97 31498 A (RANTANEN KARI ;FINLAND TELECOM OY (FI)) 28 August 1997 (1997-08-28) the whole document ---	7
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 July 2000	20/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Bijn, K

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INTERNATIONAL SEARCH REPORT

Inter. ..onal Application No
PCT/GB 00/00980

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 838 771 A (NAVIGATION TECHNOLOGIES CORP) 29 April 1998 (1998-04-29)	1,2
A	page 4, line 1 -page 5, line 18 page 22, line 23 -page 23, line 28	3,4,8,9
X	EP 0 757 313 A (INTERGRAPH CORP) 5 February 1997 (1997-02-05) page 5, line 42 -page 7, line 47	1,2,9

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. ..onal Application No
PCT/GB 00/00980

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WO 9731498 A	28-08-1997	FI 960760 A	21-08-1997
		AU 1797997 A	10-09-1997
		CA 2249545 A	28-08-1997
		CN 1211374 A	17-03-1999
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